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UNITED STATES NAVY

MEDICAL NEWS LETTER

Editor - Captain L. B. Marshall, MC, USN (RET)

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be nor susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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Notice

Due to the critical shortage of medical officers, the Chief, Bureau of Medicine and Surgery, has recommended, and the Chief of Naval Personnel has concurred, that Reserve medical officers now on active duty who desire to submit requests for extension of their active duty for a period of three months or more will be given favorable consideration.

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The Anesthetic Management of the Aged

More adventurous surgery as well as the rapid development of new anesthetic methods, improvement of already existing techniques, together with the use of more powerful and safer drugs and the combination of different techniques in "balanced anesthesia" made it possible to develop a particular field of anesthesia for the benefit of the aged.

In this 12-year study (1942 - 1953), the authors reviewed anesthesia records of patients aged 60 years and older undergoing surgery and who received a general or spinal anesthetic. The total number of all anesthetic procedures during this period was 46,253. Five thousand four hundred and fifty anesthetics were given to 5075 patients 60 years of age and older. Of this number, there were 3622 males (71.4%) and 1453 females (28.6%). The greater number of operations on male patients is explained by the role which the urology service plays in aged males.

The percentage of healthy aged patients, meaning patients free from any systemic disorder, is relatively small. The specific problems of anesthesia for the aged are, therefore, not so much associated with age

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itself, but with the morbid changes in the old organism due to cardiovascular, pulmonary, renal, and other diseases favored by old age.

It is often difficult or impossible to distinguish between an apparently healthy physiological old age with no systemic disorder and senility as the result of old age complicated by a morbid process in one or more of the vital systems. Inasmuch as the healthy old patient should not present any particular anesthetic difficulty, undoubtedly the aged patient with certain systemic diseases may offer quite a few problems and should be considered a poor risk. The anesthetic management of both may not differ at all. They each require the principles of good anesthesia and the skill and knowledge of the well trained anesthetist. There is an additional challenge in dealing with sick aged patients because of the ever existing possibility of their fast deterioration following a cardiovascular or pulmonary failure.

Cardiovascular disturbances are the most frequent preoperative complications. The relatively high number of patients who belong to the group with pulmonary complications indicates that the physiological atrophic degenerative changes of the lung tissue in the aged are often combined with additional morbid processes of inflammatory or non-inflammatory origin.

A severe anemia (hemoglobin below 10 gm.) was present in 292 patients. Most of the anemic patients suffered coincidentally from other diseases such as carcinoma of the urinary bladder, prostate, intestine, bronchus, or tuberculosis of the lungs. In addition to this, they often had focal infections such as chronic cholecystitis, prostatitis, or sinusitis. Most of these anemias appear to be secondary in origin.

The choice of the anesthesia method and the selection of the anesthetic agent for elderly patients is a special problem. It should be based on the principle of guaranteeing the utmost safety for the patient. Secondly, the needs and requirements of the surgeon should be recognized. Finally, the anesthetist should be absolutely familiar with all techniques and methods he may use. Anesthesia for aged patients is no place for methods which are not well established in the anesthetist's repertoire.

In general, no special anesthetic drug or particular technique was of significant advantage over another. However, the authors administered cyclopropane in almost all major surgical procedures and especially to the poor risk patients of this series. This gas is especially useful in geriatric anesthesia because of properties such as pleasantness of induction, minimum effect on the coronary blood flow and potency which allows high oxygen content in the anesthetic mixture. The tendency of cyclopropane to cause cardiac arrhythmias in young individuals was not a serious problem in the management of old patients. Arrhythmias incident to increased myocardial irritability were controlled by adding ether to the anesthesia mixture. Light cyclopropane anesthesia does not appear to cause significant depression of the myocardium and was well tolerated by elderly patients

with advanced heart disease. Deep anesthesia with cyclopropane or any other agent should always be avoided in patients of this type.

The use of intravenous sodium pentothal was restricted to minor surgical procedures. The drug was usually combined with nitrous-oxide-oxygen in order to utilize the sedative effect of pentothal with the analgesic action of the nitrous oxide. The definite depressant effect of pentothal on the respiratory center is a significant disadvantage. It is frequently necessary to assist the respiration early in order to avoid hypoventilation.

More than 90% of all the spinal anesthetics given were to patients belonging to the genito-urinary service (transurethral and suprapubic resection of prostate, biopsy of urinary bladder, cystoscopy). The relatively small number of severe complications following this technique justifies the conclusion that low spinal anesthesia for prostatectomies and other genito-urinary procedures is well tolerated by aged patients. In general surgery the use of spinal anesthesia was confined to operations of the lower extremities, the perineum, and the lower abdomen. In administering spinal anesthesia above the level of D-10, there is danger of interfering with intercostal muscular activity which is already weakened by age.

The use of short or longer acting relaxants such as curare or curare-like drugs should be restricted to properly selected patients. As a rule, the musculature of the aged patient is naturally flaccid as compared to that of younger adults. Therefore, there is usually no need of additional relaxation in administering, for example, a satisfactory cyclopropane-ether anesthesia.

Failure of the cardiovascular system was the main factor in the occurrence of intraoperative complications. An unusual blood pressure drop occurred 303 times due to blood loss or neurogenic reflexes. When circulatory distress did develop, it was sudden in origin and difficult to correct. Patients of advanced age should be followed closely throughout their stay in the operating room with particular attention being paid to the immediate replacement of even the smallest amounts of blood lost during a surgical manipulation. Elderly patients tolerate any degree of hypoxia very poorly and for this reason anesthetic mixtures should always have a high oxygen content.

The number of patients in this series with signs of respiratory impairment during the anesthesia course is relatively small. This might be explainable by the fact that routinely respiration is assisted, particularly in aged patients, as early as necessary to avoid even a short lasting respiratory impairment. The frequent and generous use of endotracheal tubes and pharyngeal airways to maintain constantly an unobstructed free airway is of extraordinary importance in this connection. The same is true for the repeated use of the suction catheter to remove secretions from pharynx, trachea, and bronchial tree during the anesthesia procedure.

The presence of cardiac arrhythmias is considered to be more common in old patients than in younger adults because of the degenerative changes in the aged myocardium with involvement of the conduction system. The occurrence of cardiac arrhythmias during anesthesia is not necessarily a sign of a deterioration of the patient's cardiac reserve but merely the continuation of the usual rhythm.

The postoperative complications demonstrate similarly to intra-operative disturbances the prevalence of complications which can be related to a failure of the cardiovascular system. Ninety-three patients went into circulatory distress or shock either in the operating room immediately after finishing the surgical procedure or on the ward during the very early postoperative period. This period is considered to be the most dangerous part of the entire anesthetic procedure. Hence, any abrupt and rough handling of the patient in changing his position after termination of the anesthetic and moving him from the operating table to the stretcher is avoided. The gradual lowering of the limbs after finishing a procedure done in lithotomy position under spinal anesthesia should be equally important. Once circulatory failure or shock occurs, it is much more difficult to restore the failing circulatory system of the aged patient than that of a young person. The management of postoperative shock depends upon the leading symptoms or the probable origin of the failure.

Aged patients are prone to vascular accidents such as thrombosis or embolism in the postoperative course. In this series, thrombosis or embolism which affected either the lung, the coronary arteries, or the brain occurred 74 times.

Pulmonary complications do not play a very significant role in the series. Broncho- or lobar pneumonia occurred in only 33 patients. The The frequent use of antibiotics combined with the early and repeated cleaning of the trachea and bronchi in the postoperative phase may explain this small number. In spite of the fact that elderly patients easily develop atelectatic processes of the lung following surgery, only 17 cases were observed.

Eighty-five percent of all intra- and postoperative complications occurred in connection with anesthetics lasting longer than one hour. Although most of the major surgical procedures and poor risk cases are included in the group lasting longer than one hour, there is evidence, however, that the operating time exceeding 90 minutes favors the occurrence of complications.

The rapid and progressive increase in the number of geriatric anesthetics over the entire period, the distribution of these patients to the different age groups, the importance of evaluating the patient's preoperative physical condition and its significance for grading as to physical state are discussed. The problems arising in the choice of anesthesia

method and anesthetic agent with special consideration to cyclopropane, occurrence of intra- and postoperative complications and their possible connection to the length of anesthetic and operation were also considered.

The deaths were explored as they occurred in relation to age, operative risk, anesthetic management, and time elapsing from the end of the anesthetic until death. The importance of a recovery room to reduce early postoperative complications was noted. (Corssen, G., The Anesthetic Management of the Aged - A Report of 5450 Cases: Texas Rep. Biol. and Med., 13: 386-404, Fall 1955)

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The Rise and Fall of Focal Infections

Of the many borderline fields between medicine and dentistry, few have been more controversial than the problem of focal infection. For about a decade after the announcement of the theory of focal infection, the voices in its defense became stronger and more accusing. "Oral infection" was made responsible for most ailments from pernicious anemia to appendicitis and from astigmatism to mental illness.

Much of the controversy has now subsided and it is possible to discuss the problem of focal infection more rationally. The advent of new forms of drug therapy make it all the more imperative that the components of the problem are understood. Several of these merit individual discussion.

I. The Normal Microbial Flora

Skin, mucous membranes, and some superficial tissues of man and animals always harbor a variety of microorganisms which can be placed into two groups: the resident and the transient flora.

The resident flora consists of relatively fixed types of nonpathogenic microorganisms which are found regularly in a given area of the body at a given age. If the resident flora is disturbed, it tends to re-establish itself promptly when the source of disturbance is removed.

The transient flora consists of nonpathogenic or potentially pathogenic microorganisms which occur for hours or days, but rarely for weeks, on skin or mucous membranes. It is derived from the environment and does not establish itself permanently in the area. Members of the transient flora are generally of little significance while the normal resident flora is intact. However, if the resident flora is disturbed, transient microorganisms may take over, proliferate, and produce disease.

The microorganisms that are constantly present on body surfaces are commensals. They live in constant association with tissues without

causing any significant reaction or damage. Their flourishing in a given area depends on physiologic factors of temperature, moisture, pH, and the presence of nutrients or inhibitory substances. Their presence is not essential to life because "germ-free" animals can be reared in good health, although completely lacking a normal microbial flora. Yet, the resident flora of certain areas such as the mouth plays a definite role, in maintaining health and normal function.

Transient organisms may be of great potential significance in the pathogenesis of disease. Invasive microorganisms (for example, Staphylococcus aureus) maybecome established on the surface, enter tissues through breaks in the mucous membrane, and cause progressive cellulitis, abscess formation, lymphadenitis, or even blood stream invasion. Yeast-like organisms (for example, monilia) may cause surface lesions of the mucous membranes and occasionally produce a widespread disease. Gram-negative enteric bacilli may establish themselves as transients in the upper respiratory tract and result in pneumonia. All of these examples point out how the normal resident flora maintains health, in part, by preventing the establishment of potentially disease producing microorganisms. Yet, these same types of microorganisms of the normal resident flora are the ones accused of "focal infection." Can these bacteria, which are present in every mouth, cause disease?

II. Transport and Disposal of Microorganisms

Members of the resident microbial flora of mouth and pharynx, from time to time, enter the blood stream. The exact mechanism of this progress is not certain, but it is likely that they enter tissue spaces beneath mucous membranes and are carried by lymph to the regional nodes. The vast majority do not progress any farther. A few organisms, however, perhaps bypass the filtering regional lymph nodes and are carried to the blood stream.

The entry of these microorganisms into the blood stream is favored by certain circumstances. Among them are local trauma (such as tooth extractions or extensive mucous membrane damage), coexisting infections of the oral cavity, particularly granulomas or abscesses at roots of teeth, and impairment of local defenses by nutritional deficiency or by ionizing radiation. The simple act of chewing food produces local pressure alterations of several hundred pounds and probably promotes the occasional direct entry of microorganisms from mucous membranes and tissue spaces into blood capillaries.

Ordinarily, these bacteria are promptly phagocytized, removed, and destroyed. In the presence of abnormal cardiovascular dynamics, however, they may become implanted on heart valves previously deformed by congenital lesions or rheumatic fever and may cause endocarditis. Some of the

transient bacteria might become lodged in the capillaries of the kidney, glomeruli, or synovial membranes, and produce a small abscess. This, however, is very uncommon. Bacterial endocarditis, aided by the predisposing conditions just enumerated, remains the principal disorder resulting from the dissemination of microorganisms originating in the oral cavity.

III. Hypersensitivity

The role of toxins produced by bacteria in the oral cavity probably can be discounted in the genesis of systemic illnesses. No convincing evidence for the production or significance of such toxins has ever been adduced. It must be considered, however, that hypersensitivity, associated with oral sepsis, occasionally may play a role in the production of iritis, arthritis, and other conditions which are known to be associated with hypersensitivity phenomena and which on some occasions are helped or even cured by the removal of a tooth abscess.

Hypersensitivity may manifest itself in one of two ways. The patient may develop the immediate or delayed type of hypersensitivity reaction to microorganisms associated with a chronic bronchial infection. The other type of hypersensitivity reaction is probably involved in the production of chronic progressive diseases referred to as "collagen diseases," such as rheumatic fever, scleroderma, and periarteritis nodosa. The exact etiology of these illnesses is not known, but it is postulated that certain bacterial infections or chemicals permit the development of antibodies directed against specific organ antigens.

From the discussion, the following role might be construed for "focal infection" in the causation of disease: (1) Members of the normal flora of the mouth may be abnormally distributed and may establish themselves on heart valves, causing bacterial endocarditis. (2) This bacterial dissemination is greatly aided by trauma or operative procedures in the mouth. (3) The microorganisms present in a focus of oral infection (for instance, a root abscess) may induce hypersensitivity reactions which might cause systemic disease.

The prophylaxis and treatment of systemic disease originating from "focal infection" of the oral cavity can then be directed toward the points just mentioned. Needless to say, the presence of a well established root abscess or granuloma is in itself ample reason for removal or correction without having to invoke the potential harm it might do in causing remote disease processes. If such a lesion had been responsible for the production of a hypersensitivity disease, its removal might or might not lead to cessation of the established disease process.

The therapeutic or prophylactic attitude can be much more clearly defined in relation to the danger of introducing large numbers of bacteria

into the blood stream of persons with cardiac lesions in the course of dental procedures or surgery in the oral cavity or the upper respiratory tract.

A number of recent studies have dealt with the frequency of bacteremia following tooth extraction and the possibility of its prevention by antimicrobial agents. A single injection of aqueous penicillin G, 600,000 units, three or four hours prior to extraction diminished the frequency of positive blood cultures by about one-third, but did not eliminate bacteremia. Multiple injections of penicillin, both prior to and following extraction, diminished the incidence of positive blood cultures by one-half. Because penicillin is a highly bactericidal agent for most strains of Streptococcus viridans, it is apparent that total prevention of bacteremia may not be feasible. From a theoretical standpoint, however, it is desirable to give a sufficient bactericidal drug for a sufficient period of time to help eliminate circulating microorganisms promptly and kill those that may have settled on heart valves before there is an opportunity for a protective tissue reaction to occur. Prevention of bacterial endocarditis should embody the same principles as effective treatment.

Any patient with a known congenital or acquired lesion of the heart, particularly the valves, should be considered for drug prophylaxis during oral surgery and extensive dental manipulations or extractions. Because of the frequency and severity of penicillin reactions, the dentist or physician should inquire about similar occurrences or allergic manifestations in the past. If a past history of a penicillin reaction is obtained, a skin test with dilute penicillin should be performed. If it is positive, penicillin should not be injected.

Adequate prophylaxis may consist of the daily administration of not less than 600,000 units of penicillin daily for not less than three consecutive days, beginning on the day before the oral surgical procedure. If the penicillin is given in a single daily injection, part of the material should be long-acting procaine penicillin and part rapidly absorbed aqueous penicillin. If penicillin cannot be administered, 1 gm. of one of the tetracycline drugs (Aureomycin, Terramycin, Tetracyn, Achromycin) or chloramphenicol should be given daily in four divided doses by mouth for not less than three days. The ultimate proof of the efficacy of such prophylaxis is lacking. To date, there has been no large series of alternate patients treated with these drugs or given placebos and studied for the development of manifest disease. The recommendations for prophylaxis are based on principles derived from clinical treatment of established endocarditis and, therefore, may not be applicable. (Jawetz, E., The Rise and Fall of Focal Infection: Oral Surg., 8: 1063-1068, October 1955)

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Treatment of Surgical Patients Having Anuria and Uremia

Anuria and uremia are complications that may occur in every phase of surgery and may present problems to every surgeon or surgical specialist. Regardless of the basic cause of the complication, treatment is guided by four cardinal principles: (1) maintenance of body fluid; (2) correct control of electrolytes; (3) suppression of protein breakdown (forced high caloric low protein diet); (4) avoidance of infection. If these measures appear to fail or carry too great a risk, then a fifth principle is followed: (5) elimination of retention products by means of (a) artificial kidney, (b) peritoneal lavage, or (c) intestinal lavage.

The application of these principles in the actual management of surgical patients having anuria and uremia is demonstrated in case reports. For each specific case, one or two techniques (of the many that are used for that case) will be commented upon. Because each case offers examples of different techniques, together they comprise a review of present-day management of uremia.

Case reports are grouped under headings: (1) surgery of the blood vessels and the heart, (2) general abdominal surgery, (3) gynecologic surgery and obstetrics, (4) genito-urinary surgery, and (5) blood transfusion.

Surgery or trauma may lead directly to certain forms of renal failure, and surgery may provoke or may coincide with accidents that lead to renal insufficiency. Coronary thrombosis, thrombosis of arteries to legs, mesentery, or kidneys, subarachnoidal hemorrhage, hepatorenal syndrome, pancreatitis, infusions of distilled water, or mismatched transfusions may happen during or shortly after surgery and each condition may cause renal failure.

Often, renal shutdown develops on the basis of pre-existing renal disease. It may be impossible to unravel the etiology for a given clinical situation and until proved otherwise one has to treat the patient in the hope that he has a curable disturbance of renal function.

An outline of the treatment of acute and chronic uremia in surgical patients, as presented, follows:

Attempts to Prevent Tubular Necrosis

1. Restoration of low blood pressure either at the onset of acute anuria or in its later course. This is best done with 6% dextran in 5% glucose (not in saline as most of the commercial dextrans come). Dextran is better than blood unless blood is demonstrably lost. The virtues of restoring renal function with pressor substances like noradrenalin are still open to speculation, and these do not replace blood volume in oligemia.

2. In cases of hemoglobinuric (incompatible blood) or myohemoglobinuric nephrosis (crash syndrome), perhaps of use if immediately administered:

   A. 2000 milliliters of 5% glucose plus 500 milliliters of 5% $NaHCO_3$ I. V. (Dangerous if given when kidneys already are blocked.)

   B. Osmotic diuretic: 100 cubic centimeters 25% mannitol I. V. (Other diuretics are dangerous.)

   C. Large exsanguinotransfusions to remove free hemoglobin.

   D. All other methods: intermittent high spinal anesthesia, procaine I. V., and decapsulation seem to be either useless or harmful.

In the Presence of Renal Failure

Once renal failure is an established fact, the measures mentioned are only harmful. For further management, it is important to recognize whether a patient is in an anuric (or severely oliguric) phase, or in a diuretic phase.

Most patients with chronic uremia must of necessity excrete large amounts of urine, and to those cases, the recommendations listed under chronic uremia pertain. Some, however, are oliguric, notwithstanding sufficient hydration; they should be treated as in acute anuria.

1. Maintenance of body fluid. —Acute anuria: anuric phase—700 milliliters per day plus compensation for loss; diuretic phase—enough to prevent dehydration, 2000 or 3000 milliliters per day. If over hydrated during anuric phase: venesection, Nasulfate 50 gm. per oz. to cause diarrhea; filtering type of artificial kidney (most effective), or dialysis with dialyzing fluid that is made hypertonic by addition of glucose to its usual composition, either in artificial kidney or in peritoneal lavage.
   Chronic uremia: fluid often has to be forced, sometimes with NaCl.

2. Control of electrolytes. —Dialysis will correct the hypotonic or hypertonic status of any electrolyte within a few hours; avoiding restoring all Na^+ at one time.

Na^+ Acute anuria: No Na administration; compensation for loss only (See exception under "Acidosis").

Chronic uremia:	Na lactate 120 milliequivalents per day to restore HCO'_3. NaCl to replace urinary NaCl loss. Rarely salt-free diet when indicated by hypertension, edema, or cardiac failure.
K^+ Hyperkalemia (often in acute anuria):	Carboxylic resin sodium salt administration (30 to 60 gm. per day in divided doses, with care against overshooting; give laxative with it). Hypertonic glucose (plus insulin) or invert sugar I. V. High caloric, low protein diet. If serious, dialysis.
Hypokalemia (often in chronic uremia or in diuretic phase of acute uremia):	Administration of KCl, slowly I. V. (20 milliequivalents mixed in large volume diluent) or K gluconate (kaon) by mouth.
Ca^{++} Often hypocalcemia, but not so often tetany:	1 gm. Ca gluconate I. V. Aluminum hydroxide, to bind P, multiple doses as much as patient can take (5 to 10 milliliters 12 times per day).
Acidosis-acute anuria or uremia:	Carbohydrate. Rarely Na lactate (40 milliequivalents) or Na bicarbonate (4 gm. per day), only if HCO'_3 is lower than 12 milliequivalents per liter. Dialysis, which removes the abnormal acids.
Chronic uremia:	Na lactate 120 to 180 milliequivalents per day; K gluconate if K^+ also is low. Rarely (but sometimes) dialysis.

3. Suppression of protein catabolism with high caloric, low protein diet. —Avoid transfusions and surgery if at all possible; they increase protein catabolism. Forced high caloric (over 2000 calories), low protein (20 to 40 gm.) regimen (Borst) is very useful in chronic uremia; in acute uremia, administer as much as is practical. Keep diet diary and calculate caloric intake. Try fat emulsion (ediol, lipomul oral) by mouth or (diluted) by gastric drip. If necessary: 20% invert sugar (travert) plus insulin I. V. or hypertonic (up to 40%) glucose or invert sugar by cardiac catheter. Intravenous fat emulsion (may be practical in the future).

4. Prophylaxis and treatment of infections with antibiotics. —Erythromycin seems to be well tolerated. Streptomycin, when not excreted, may accumulate and cause irreparable vestibular (nerve) damage.

5. Elimination of retention products by dialysis. —Also removal of acid metabolites, correction of electrolytes, and reduction of edema.

Artificial kidney:	5 to 6 hours of dialysis will suffice, and its effect lasts 4 to 7 days.
Peritoneal lavage:	not often possible in postoperative patients.
Intestinal lavage:	electrolyte regulation difficult.

(Kolff, W. J., Experiences in the Treatment of Surgical Patients Having Anuria and Uremia: Surg. Gynec. & Obst., 101: 563-576, November 1955)

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A Roentgenologic Study of a Human Population Exposed to High-Fluoride Domestic Water

Roentgenological manifestations of fluoride effects in human bones occur rarely and are less often recognized. When bone changes due to fluorides were first described by Roholm in 1937, they were gross changes and, without question, most unusual. Similar bone changes ascribed to fluoride effects have been reported by a number of investigators under various circumstances. In most instances, the number of cases was limited; there has been a tendency to stress the bizarre, attention has been directed to individuals with gross physical change or roentgenographic evidence of marked change; and the lack of bone change in other members of the same population group with comparable risk of exposure has not been emphasized or reported.

Many American communities have long used domestic water supplies containing natural fluorides ranging from 1 to 6 ppm F, and in a few instances, higher concentrations, but rarely have roentgenologists observed or reported bone changes known to be associated with fluorides from this source.

More recently, the introduction of fluorides into water supplies as a public health measure has created new interest in fluoride effects. Unusual changes, described earlier in cryolite and rock phosphate workers have, by implication, typified the "effects of fluoride exposure." These findings have created a bias in the interpretation of the physiologic fluoride effects, a bias that has pervaded the evaluation of data concerning domestic water supplies containing but trace amounts of natural or mechanically added fluroides.

The primary object of this report is to present the roentgenographic findings of a ten-year study of 237 persons, approximately one-half residing in a high-fluoride area (Bartlett, Texas), 8 ppm F in drinking water, and the other half residing in a control area (Cameron, Texas), where the water

supply contained 0.4 ppm F, and to describe the findings that might be ascribed to prolonged fluoride ingestion. Comparative evidence of bone change from a long-term large animal study is also presented. The following types of roentgenographic bone conditions were seen in humans who used a water supply containing excessive fluoride (8 ppm F) for long periods.

1. Increased bone density with or without coarsened trabeculation, with a "ground-glass" appearance.

2. Coarsened trabeculation, showing lines of stress, without increased bone density.

3. Increased thickening of cortical bone and periosteum with equivocal narrowing of bone marrow spaces. (This is positively demonstrated in cattle at toxic levels.)

The data, based on a study of 237 cases presented on a statistical basis in an earlier paper, clearly demonstrate that except for dental mottling, ingestion of water containing fluorides up to 8 ppm produces no deleterious bone changes: no ususual incidence of bone fractures, arthritis, hypertrophic bone changes or exostoses, or interference with fracture healing; no cases of "poker spine" and no evidence of associated functional or systemic effects.

Excessive fluorides in a water supply may produce roentgenographic evidence of bone changes, but the observable changes—

1. Occur in only a select few (approximately 10 to 15% of those exposed).

2. Are slight, often difficult to recognize, and in most instances equivocal in degree.

3. Bear no resemblance to the bizarre findings described in some cases of long exposure to cryolite or rock phosphate dust, nor to those attributed by some investigators to excessive fluorides in domestic water supplies.

4. Are not associated with other physical findings, except for dental mottling in persons who resided in the high-fluoride area during the tooth formative period (up to 8 years of age).

5. Cannot be definitely ascribed to excessive fluorides alone.

6. Do not necessarily occur even though the fluoride content of the bone may be six times that of "normal" bone.

There is some indication that the ingestion of excessive fluoride in water and the "fluoride effect" of the degree encountered in this study may, on occasion, have a beneficial effect in adult bone, as in counteracting the osteoporotic changes of the aged. (Nicholas, C. L., et al., A Roentgenologic Study of a Human Population Exposed to High-Fluoride Domestic Water - A Ten-Year Study: Am. J. Roentgenol., 74: 874-884, November 1955)

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Medical Department Correspondence Course - Atomic Medicine

The Medical Department Correspondence Course, Atomic Medicine, NavPers 10701-A, is now ready for distribution to eligible regular and reserve officer and enlisted personnel of the Medical Department. Applications for this course should be submitted on Form NavPers 992 (with appropriate change in the "To" line), and forwarded via appropriate official channels to the Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md.

This is an objective question type course designed to acquaint and familiarize Medical Department personnel with the principles of Atomic Medicine. During the past decade, the problems of dealing with radiation and radioactive materials have grown to major proportions, and have become one of the main concerns of an increasing number of military, industrial, and medical personnel. Although ionizing radiations have been recognized and studied for more than fifty years, the atomic explosions of World War II marked the beginning of a new period in which atomic warfare and defense, and peacetime use of atomic energy would influence the lives of everyone. This new era entails added responsibilities to the medical profession and offers new opportunities for medical research and treatments. As a result, the field of atomic medicine has expanded rapidly, gaining vital information for atomic defense, and contributing knowledge to other medical fields. The textbook utilized as reading material for this course is a complete new revision of Atomic Medicine, 2nd Edition, edited by RADM C. F. Behrens, MC USN, and published by The Williams and Wilkins Company.

Atomic Medicine, NavPers 10701-A, consists of eight (8) objective question type assignments and is evaluated at twenty-four (24) Naval Reserve Promotion and Non-disability Retirement Points. Regular and Reserve personnel who have satisfactorily completed the previous course, Radiological Defense and Atomic Medicine, either the thesis or objective type course will receive additional credit for this course in that this is a complete revision of the former course. (NavMed School, NNMC, Bethesda, Md.)

High School Graduate Training Program

The Navy is offering training opportunities for high school students and recent high school graduates who will enlist in the Regular Navy. Under this program, applicants may enlist and may be accepted for certain Navy technical training schools of their choice, providing they meet certain mental and aptitude qualifications.

Among these training schools are the dental technician school and the hospital corps school. Reserve Medical Department officers who know of high school students who may desire to enter the professions but cannot afford to do so, can help the Navy by advising them or their parents to look into this program. If accepted in the rating of High School Hospital Recruit, they are guaranteed training at either the dental technician school or the hospital corps school.

The man will receive training which will give him a good understanding of the profession which he may desire to enter. His years of Navy service will give him wider association with the profession and his salary, if saved, will give him a good start on his professional education. Full details on this program may be obtained from the nearest Navy Recruiting Office. (DentDiv, BuMed)

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Navy Mutual Aid Increases Terminal Dividend

The Board of Directors of the Navy Mutual Aid Association, on 18 November 1955, voted to pay a $1000 terminal dividend to the designated beneficiary of any member whose death shall occur after 1200 EST on 18 November 1955. This dividend payment is in addition to the regular benefit of $7500 and is payable on a member's death in cash or as an annuity. Paid-up memberships of less than $7500, terminated by death, will be increased by 13-1/3%. This dividend does not increase loan or surrender values of memberships.

This action by the Board of Directors augments the program begun one year ago when the dividend policy was first established. The Association, in announcing the dividend decision, explained that all members would share equally in the increased benefit, irrespective of length of membership. It was stated that the policy of increased benefits to survivors was in keeping with the basic philosophy of the Association which is to provide the dependents of its members with the greatest possible benefits at the least possible cost.

For additional information, officers whould address their inquiries to the Navy Mutual Aid Association, Navy Department, Washington 25, D. C.

Medical Department Correspondence Course - Special Clinical Services (General)

The Medical Department Correspondence Course Special Clinical Services (General), NavPers 10702 (Rev 54) has been withdrawn from circulation due to obsolescence of certain text material contained therein.

The effective date of withdrawal for crediting of Naval Reserve promotion and nondisability retirement points has been established as of 31 July 1956. All personnel currently enrolled in this course must complete course prior to this date in order to receive letters of satisfactory completion. (NavMed School, NNMC, Bethesda, Md.)

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New West Virginia State Law Requires Annual Registration of Dentists

The Secretary of the West Virginia Board of Dental Examiners has advised the Bureau of Medicine and Surgery that the 1955 revision of the State Dental Law requires the annual registration of dentists licensed to practice dentistry in West Virginia. All dental officers on active duty who hold licenses in West Virginia which they desire to keep valid should send for registration blanks to: John B. Davis, D.D.S., Secretary, West Virginia Board of Dental Examiners, 510 Goff Bldg., Clarksburg, W. Va.

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Three Brothers Appointed Ensign (1995)

Three brothers, all students at the University of Oregon Dental School at Portland, will soon be sworn into the Ensign (1995) dental program. They are Floyd, Heber, and Donald Packard who are three boys of a family of 17 from Salt Lake City. Floyd and Heber will graduate in 1956, and Donald will graduate in 1957.

Captain Eric Hoag DC USN, District Dental Officer of the 13th Naval District, and Captain Harold Odegard, Dental Reserve Program Officer, will assist in this ceremony. They will also meet with members of Reserve Dental Company 13-2 while in Portland. (TIO, BuMed)

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 16 May 1955.

"Honors"

At the Honors Night Dinner of the 62nd Annual Convention of the Association of Military Surgeons, the following awards were presented:

Sir Henry Wellcome Medal and Prize to Colonel W. F. Bowers MC USA; Dr. J. M. A. Weiss, Honorable Mention.

The Gorgas Medal to Colonel V. A. Byrnes USAF (MC).

The Major Louis Livingston Seaman Prize to LCDR Vera E. Thompson NC USN.

The Stitt Award to Medical Director D. J. Davis, USPHS.

The McLester Award to Major Helen B. Gearin USA, Retired.

The Founders Medal to Brigadier General L. C. Fairbank USA, Retired; Brigadier General J. R. Wood, MC USA; and Colonel L. F. Saylor, MC USA.

(Military Medicine, November 1955)

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Active-Duty Dental Officers Eligible for American Dental Association Membership

The newly published pamphlet "Membership in the American Dental Association" states that dentists in the employ of the Federal government need not be members of state and local dental societies to hold active membership in the Association. Naval dental officers on active duty may obtain Federal Dental Services Active Membership Application blanks from the Secretary, American Dental Association, 222 East Superior St., Chicago 11, Ill., The annual dues for members of Federal Dental Services are $20.00, which includes a subscription to the Journal of the American Dental Association for one year. The new membership rules set 31 March 1956 as the date for termination of membership in the Association if dues for 1956 have not been paid. (DentDiv, BuMed)

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Recent Research Projects

(Continued from November 18 issue of Medical News Letter)

Naval Medical Research Unit No. 4, Great Lakes, Ill.

1 The Total Leukocyte and Differential Counts of Naval Recruits During Routine Inoculation. NM 005 051.14.17, 25 May 1955.
2 Studies of Respiratory Disease Viruses Isolated and Propagated in Tissue Culture I. Influenza A, B, and C. NM 005 051.24.01, -02. and 03. 1 July 1955.

Naval Dental Research Facility, Great Lakes, Ill.

1 Oral Phosphatase Levels and Caries Activity. NM 008 013.12.05, June 1955.
2 Inhibitory Effect of Sodium N-Lauroyl Sarcosinate on Oral Lactobacilli When Grown on Various Media. NM 008 013.04.13, August 1955.

Naval Air Development Center, Johnsville, Pa.

1 The Action of Mescaline on the Cerebral Metabolism of the Rhesus Monkey as Defined by the Oxygen and "Glucose" Utilization of the Intact Brain. TED NADC AE-1402.00. NM 001 103 300. Report No. 4. Phase VI. (Formerly NM 001 060.12) 18 August 1955 .
2 The Effect of Sweating and Changes in Blood Flow on the Heating of the Human Skin. NADC-MA-5510. NM 001 103 301. Report No. 6, 30 August 1955.
3 Human Tolerance to Positive G as Determined by Physiological End Points. TED NADC AE-1401. Project NM 001 100 302. Report No. 2 (formerly NM 001 060.06) 30 August 1955.

Medical Research Laboratory, Submarine Base, New London, Conn.

1 Prediction of Submarine School Success Through the Use of Selected Themes in the Navy Thematic Apperception Test. NM 003 041.54.01, 2 May 1955.
2 Field Study of Detectability of Colored Targets at Sea. NM 002 014.09.03, 26 May 1955.
3 Report on PreProduction Samples of Flying Goggles - Type II (Amer. Optical Co.) Memorandum Report No. 55 - 6. NM 002 014.08.11, 7 July 1955.

Naval School of Aviation Medicine, NAS, Pensacola, Fla.

1 Methodological Studies in Configural Analysis: I. Location of Predictively Useful Profiles. II. Development of Classification Equations. NM 001 110.01, 1 February 1955.
2 The Relationship Between Behavior in a Stress Situation and Later Separation from Flight Training with Expressed Anxiety Toward Flying. NM 001 101 108.01, 8 June 1955.
3 Vocabulary of College Students in Classroom Speeches. Joint Project NM 001 104 500. Report No. 60, 15 August 1955.

Naval Air Material Center, Aero Medical Equipment Laboratory, Phila. Pa.

1 Oxygen Servicing Trailer, Recharge Hose, Spen Part No. 144199; Performance after Period of Wear and Abuse. TED NAM AE 5129, Report XG-T-257 of 13 September 1955.
2 Helmets, Flying and Protective, Evaluation of British Inner Liner Flying Helmet, Type F, and Protective Flying Helmet MKI. TED NAM AE 5209.3, Letter report XG-L-105-955 of 21 September 1955.
3 Suitability of a Rebound Test Tower for Use in the Physical Evaluation of Aviators' Protective Helmets. Report TED NAM AE 5209.3 of 23 September 1955.
4 Optical Sight Brightness and Radar Scope Position: Part 1. Parameters Affecting Target and Reticle Image Visibility at High Altitudes under Daylight Conditions. Report TED NAM AE 7054, Part 1 of 11 Oct. 1955.
5 Scott Aviation Oxygen Mask to Regulator Tube and Emergency Oxygen Connection Assembly, test and evaluation of. TED NAM AE 5148, Report XG-T-261 of 21 October 1955.

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BUMED NOTICE 11011 1 November 1955

From: Chief, Bureau of Medicine and Surgery
To: All Activities Under the Management Control of BuMed

Subj: Real Property Evaluation (NAVEXOS-4026); schedule for submission of

Ref: (a) SecNavInst 11011.9, Subj: Retention of Real Property

This notice provides a schedule for submission of the real property evaluations required by reference (a).

BUMED INSTRUCTION 5360.12A 4 November 1955

From: Chief, Bureau of Medicine and Surgery
To: Commandants, Naval Districts (continental) and River Commands

Subj: Armed Forces care-of-the-dead contracts, Fiscal Year 1956

Ref: (a) Chapter 17, Manual of the Medical Department
(b) BuMedInst 5360.8, Subj: Annual care-of-the-dead contracts
(c) BuMedInst 5360.10, Subj: Care-of-the-dead program; administrative and fiscal accounting instructions relative to

Encl: (1) Department of the Army contracts
(2) Department of the Navy contracts
(3) Department of the Air Force contracts
(4) United States Coast Guard contracts

This instruction promulgates information concerning care-of-the-dead contracts available at Army, Navy, Air Force, and Coast Guard activities during Fiscal Year 1956. BuMed Instruction 5360.12 is canceled.

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BUMED INSTRUCTION 11014.2 4 November 1955

From: Chief, Bureau of Medicine and Surgery
To: Commanding Officers, National Naval Medical Center and all Naval Hospitals

Subj: Controlled Maintenance Program; establishment of basic elements

Encl: (1) List of BuDocks Technical Publications

This instruction provides addresses with Bureau guidance on the Department of Defense controlled maintenance program for real property maintenance and utilities operations.

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BUMED INSTRUCTION 6260.5 7 November 1955

From: Chief, Bureau of Medicine and Surgery
To: All Ships and Stations

Subj: Threshold limit values for toxic materials

Encl: (1) Table of Threshold Limit Values

This instruction establishes as a basic reference the threshold limit values of toxic materials adopted by the American Conference of Governmental Industrial Hygienists, and provides guidance toward the reduction of potential health hazards encountered in the industrial environment for both military and naval civilian personnel.

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BUMED INSTRUCTION 6710.23 15 November 1955

From: Chief, Bureau of Medicine and Surgery
To: All Ships and Stations

Subj: Sulfadiazine Tablets, USP, 0.5 Gm. (7-1/2 gr.), 1000s, FSN 6505-146-2200

This instruction promulgates instructions for the suspension of all stocks of subject item manufactured by the Intermedico Corporation.

This instruction applies to all field activities having any of the involved material on hand. Elements of the Medical and Dental Supply Distribution System have been furnished separate instructions by letter.

Suspend any on-hand stocks of subject item manufactured by the Intermedico Corporation pending further notification. No reports of quantities suspended are required.

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Change of Address

Please forward requests for change of address for the News Letter to: Commanding Officer, U.S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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MEDICAL RESERVE SECTION

Clinical Clerkship Training and Senior Medical Student Program

Second and third year medical students commissioned as Ensigns, 1995 USNR are eligible for up to 60 days active duty for training with full pay and allowances of their rank while so serving at any teaching naval hospital as may be designated by the Chief, Bureau of Medicine and Surgery. Commencing 1 July of each year, this training known as the Clinical Clerkship Program, is available to the medical student during his vacation from medical school; it provides indoctrination and orientation into naval medicine, rotation through the major professional services and performance of on-the-job training duties at a naval teaching hospital. Each officer is eligible for only one tour of this duty during his tenure as an Ensign 1995 (Medical) USNR.

Third year medical students who expect to qualify for acceptance into their final year of medical school and who wish to avail themselves of the Navy's new Senior Medical Student Program should make application at the earliest prior to 1 February 1956; applications for this program will not be accepted after this date.

Here are the main requirements for the Navy's Senior Medical Student Program. Applicants should:

1. Be commissioned as an Ensign, 1995 (Medical) USNR, or must agree to accept such an appointment if selected for the program.
2. Be accepted for enrollment in a school of medicine accredited by the American Medical Association.
3. Meet the same physical standards established for Regular Navy Staff Corps officers.
4. Upon completion of medical school, agree to accept a Regular Navy commission; if a regular commission is not tendered, to accept a commission in the Naval Reserve.
5. Agree to participate in the National Intern Matching Plan. In the event the individual is not matched with the Navy, he must accept a superseding appointment in the Naval Reserve, and will be in an inactive status while completing a civilian internship not to exceed 12 months. Upon completion of this internship, a regular commission must be accepted, if tendered. Candidates are not required to participate in a naval internship, but may complete a civilian internship of their choice.

Following selection, Ensign, 1995 (Medical) officers will be ordered to active duty at the medical school where enrolled and while in attendance and successfully pursuing their professional studies, will receive the full pay and allowances of their rank. Pay and allowances are based on previous service, active or inactive, as follows:

1. Less than two years and no dependents - $338.58 per month; with dependents - $355.68 per month.
2. Over two but less than three years and no dependents - $353.40 per month; with dependents $370.50 per month.
3. Over three but less than six years and no dependents - $412.68 per month; with dependents $429.78. per month.
4. Over six and less than eight years and no dependents - $428.28 per month; with dependents $445.38 per month.

Ensigns, 1995 (Medical) availing themselves of this Senior Medical Student training and accepting an appointment in the Regular Navy, will be obligated to serve on active duty at the discretion of the Secretary of the Navy for a minimum period of three years, excluding the period served as a Senior Medical Student and in a Naval internship.

Applications for Ensign 1995 (medical) USNR and the Senior Medical Student Program are currently being processed at all of the below Recruiting Stations and Offices of Naval Officer Procurement where more detailed information regarding these programs may be obtained.

Candidates who meet professional and physical requirements will be considered for selection by a board convened in the Bureau of Medicine and Surgery for the purpose of selecting 100 applicants for enrollment in this program, commencing with the fall term of school in 1956.

Navy Recruiting Stations and Offices of Naval Officer Procurement

New Court House & Post Office Bldg.
Post Office Square
Boston 9, Mass.

Post Office Bldg.
Broadway
Albany 1, N. Y.

Post Office Bldg.
Ellicott Swan & Oak Sts.
Buffalo 3, N. Y.

346 Broadway
New York 13, N. Y.

Room 243, Post Office &
Court House Bldg.
5th, Main, and Walnut Sts.
Cincinnati 2, Ohio

Blackburn Bldg.
13 S. 13th St.
Philadelphia 7, Pa.

Old Federal Bldg.
300 Smithfield St.
Pittsburgh 19, Pa.

Post Office Bldg.
3rd and Mulberry Sts.
Macon, Ga.

Federal Bldg.
Fayetteville and Martin Sts.
Raleigh, N. C.

New Court House Bldg.
Broad St. & 9th Ave., South
Nashville, Tenn.

Room 302, U.S. Court House
423 Canal St.
New Orleans 16, La.

Post Office Bldg.
4th and Gold Sts.
Albuquerque, N. M.

Room 1904, Santa Fe Bldg.
1114 Commerce St.
Dallas 2, Texas

Federal Office Bldg.
Fannin and Franklin Sts.
Houston 2, Texas

19th & California Sts.
Denver 2, Col.

American Fore Bldg.
844 No. Rush St.
Chicago 11, Ill.

Room 421, New Federal Bldg.
Fort and Shelby Sts.
Detroit 26, Mich.

Federal Office Bldg.
2nd and Washington Aves, So.
Minneapolis 1, Minn.

2603 Walnut St.
Kansas City 8, Mo.

Court and Customs House
815 Olive St.
St. Louis 1, Mo.

Naval Personnel Center
30th and Fort Sts.
Omaha 11, Neb.

751 So. Figueroa St.
Los Angeles 17, Calif.

Federal Office Bldg.
Leavenworth & Fulton Sts.
San Francisco 2, Calif.

Box 2811, Bldg. 32
Fort Douglas
Salt Lake City, Utah

28 West Granite St.
Butte, Mont.

110 Union St.
Seattle 1, Wash.

U.S. Information Center
604 17th St., N. W.
Washington 25, D. C.

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PREVENTIVE MEDICINE SECTION

The Surveillance of Poliomyelitis in the United States in 1955

(The following review of the surveillance of poliomyelitis in the United States was excerpted from a report prepared for presentation before the Joint Session of Laboratory and Epidemiology Sections, American Public Health Association at Kansas City, Mo., on November 15, 1955, by Alexander D. Langmuir, M.D., Neal Nathanson, M.D., and William Jackson Hall, Ph. D. of the Communicable Disease Center, Public Health Service, U.S. Department of Health, Education, and Welfare, Atlanta, Ga. Excerption was necessary in adopting the report for publication in the U.S. Navy Medical News Letter. The complete text will appear at a later date in the American Journal of Public Health. The report is reproduced here in nearly complete form as an item of more than ordinary interest to Navy medical officers who are often questioned as to the safety and effectiveness of the vaccine currently being distributed.)

The National Poliomyelitis Surveillance Program was established by the Surgeon General of the Public Health Service on April 28, 1955, immediately after the recognition that cases of poliomyelitis were occurring in association with vaccine manufactured by Cutter Laboratories.

The purpose of the Program was to provide a clearinghouse for the collection, consolidation, and dissemination of all pertinent epidemiologic information regarding the poliomyelitis problems confronting the nation.

The Poliomyelitis Surveillance Unit was established in the Communicable Disease Center with headquarters in Atlanta, Ga. Cooperative arrangements were made for the direct exchange of reports with all States and Territories and with more than 40 virus laboratories both in government and in academic institutions. A total of 42 Epidemic Intelligence Service Officers, including 29 physicians, 4 nurses, 6 statisticians and 3 veterinarians, were either assigned to full time polio duty or alerted for first priority polio investigation as needed. Funds were made available

for diagnostic support of surveillance activities to the collaborating laboratories first through the Sectional Research Program of the National Microbiological Institute and after July 1, 1955, through the Communicable Disease Center.

Poliomyelitis Surveillance Reports have been issued regularly since May 1 to all State Health Officers, State Epidemiologists, directors of participating laboratories and many others having responsibilities in the field of poliomyelitis. News releases giving summaries of the data were issued from the Surgeon General's Office. Much of the information collected by the Polio Surveillance Unit was used in the "Technical Report on Salk Poliomyelitis Vaccine," issued June 10, 1955, and the "Report on Poliomyelitis Vaccine Produced by the Cutter Laboratories," issued on August 25, 1955.

This report will consider two main questions. The first will be an epidemiologic evaluation of the safety of polio vaccines as used this year including a documentation of the difficulties arising from the use of some vaccine manufactured by the Cutter and Wyeth Laboratories, and an appraisal of the safety of vaccines in current use. The second question will be a preliminary evaluation of the effectiveness of the vaccines as actually used this year.

The authors wish to emphasize that the data included in this paper were reported by the States and the participating laboratories. Their contribution is gratefully acknowledged.

Epidemiologic Observations on Vaccine Safety

The first concern of the Poliomyelitis Surveillance Unit was the prompt verification of reports to make possible an evaluation of the significance of the cases of poliomyelitis which were occurring among recently vaccinated children. Shortly, the occurrence of cases among family contacts of vaccinated children broadened the scope of the problem. The possibility of community spread from these sources also caused great concern, but fortunately this proved to be of relatively limited consequence. Thus, three types of vaccine associated cases were recognized, namely, vaccinated cases, family contact cases, and community contact cases.

The cases of poliomyelitis associated with Cutter vaccine are shown in Table I (omitted) by State of report, type of association, and paralytic status. A total of 204 associated cases with 11 deaths have been accepted by the poliomyelitis Surveillance Unit. Of these, 79 were among vaccinated individuals, 105 among family contacts, and 20 among community contacts. Three-fourths of the cases were paralytic. The case fatality rate was 5%. The cases were concentrated in California and Idaho where certain lots of Cutter vaccine were provided by the National Foundation for Infantile Paralysis

(NFIP) for first and second grade school children. Cutter vaccine was also used in school clinics in Nevada, Arizona, New Mexico, and Hawaii. The cases that occurred in small numbers in the other States were associated with vaccine that had been distributed in commercial channels.

. . . . . A total of 67 cases were associated with either lot 6039 or 6058. These two lots were used in Idaho and for many cases a distinction between the lots was not possible. Cases were associated with all but two of the other lots provided by the NFIP and with all but one of the lots distributed commercially.

. . . . . The vaccinated cases are concentrated in the period 4 to 14 days, whereas the family contact cases are concentrated in the period 8 to 28 days which represents a double incubation period.

The three phases of the Cutter Incident are shown graphically in Figure I (omitted). On April 27, when only six cases associated with Cutter vaccine had been reported, it was observed that the dates of inoculation were concentrated in the early period after release of the vaccine, and the intervals from inoculation to first paralysis seemed short. These findings provided a basis for some epidemiologists to predict a substantial outbreak of 100, 200, or even as many as 500 cases among vaccinated children. Actually, only 79 cases were reported.

During the middle of May, when the first cases among family contacts came to recognition, similar short intervals were also noted and the prediction was made that 100 or more cases would occur among family contacts. Actually, 104 cases were reported.

No community contact cases came to recognition for 12 days after the first family contact cases were reported and then only in small numbers. It was not possible to predict the numbers to be expected, and only 20 were reported.

Figure I includes only the paralytic vaccine associated cases. The predicted curves are based upon incubation period data reported by Bodian from inoculation of Mahoney virus intramuscularly into Cynomolgus macaques, assuming an even distribution of vaccinations from April 16 to 27.

One of the characteristics of the Cutter associated vaccinated cases was the correlation of site of first paralysis with site of inoculation. Similar findings have been reported by Bodian in Cynomolgus macaques.

Table 6 (omitted) presents a summary of the laboratory findings from Cutter associated cases and their contacts. Isolations of polio virus have been reported in association with about one-half of the paralytic cases and about one-third of the nonparalytic cases. Type I virus has been identified in association with 100 cases, and Type II and Type III virus on single occasions. Not included in the table is a report by Dr. John Fox of Tulane University of the isolation of Type III virus from a fatal vaccinated case from which a previous isolation of Type I virus had also been made.

These are the epidemiological data which support the conclusion in the Cutter Report, " . . . the development of the disease in some of these patients was the result of the presence, in infective amounts, of live poliomyelitis virus in some distribution lots of Cutter vaccine."

The experience with Cutter naturally alerted all health officials to the possibility of other outbreaks of inoculation poliomyelitis. In May, a small number of cases were reported from Pennsylvania in children who had recently received vaccine made by Wyeth Laboratories. Three cases had developed initial paralysis in the inoculated extremity. A special study was immediately undertaken. Additional cases were discovered in family and community contacts and also in a number of persons without history of vaccination or contact. This evidence was insufficient to exclude the possibility that the reported associations were coincidental.

Later, however, several cases associated with one lot of Wyeth vaccine were reported from Maryland. These occurred not only among vaccinated children, but also among family and community contacts under circumstances that raise strong suspicion of some explanation other than coincidence.

This lot of vaccine has been tested extensively in both tissue culture and monkey tests by the Division of Biologic Standards of the National Institutes of Health and independently by collaborating laboratories. No poliomyelitis viruses have been isolated.

Both of the foregoing occurrences involved lots of vaccine that were released and used shortly after the announcement of the results of the 1954 Field Trials. On May 7, the Surgeon General recommended temporary suspension of the vaccination program pending a full reappraisal of the safety testing and clearance procedures for vaccines. By that time, over four million inoculations had been given. Except for the incidence of poliomyelitis in connection with certain lots of Cutter and one lot of Wyeth vaccine, no other situation involving the possibility of unsafe lots of vaccine was recognized.

Beginning on May 13, and continuing to the present, all lots of vaccine have been released under revised safety standards. Epidemiologic surveillance for possible untoward incidents has been constantly maintained. All States and Territories have been and are reporting cases of poliomyelitis which occur among vaccinated children. These are tabulated by lot number so that individual cases associated with the same lot but occurring in separate States will be promptly recognized. Special attention is directed toward cases which occur at an interval of 4 to 14 days after inoculation and to paralytic cases showing first paralysis at the site of inoculation. The essential data on each case occurring in a vaccinated person are printed in the Surveillance Reports, thus making these data available to all responsible authorities.

The cases of poliomyelitis that have been reported among vaccinated persons since the first of July have shown certain distinctive characteristics. Over three-fourths have been reported as nonparalytic. Most have occurred more than 30 days after vaccination, and only a few in the interval 4 to 14 days. Among the relatively infrequent paralytic cases, instances with first paralysis occurring at the site of inoculation have been conspicuously rare. No single lot of vaccine has been associated with more than one such case. Thus, no evidence has come to light that tends to incriminate any lot of vaccine of any manufacturer that has been released and used since the new safety standards were adopted.

Evaluation of Effectiveness

Special Studies: During the period prior to May 7, when inoculations were temporarily suspended, few plans had been made to conduct controlled studies of the effectiveness of the vaccines in current use. The anticipated flow of fairly large supplies of vaccine and the known great demand for it seemed to preclude the possibility of selecting adequate control groups. When it became apparent, however, that supplies of vaccine would not be sufficient even to meet the commitments of the NFIP contracts, a unique opportunity for evaluation studies was presented. The situation had similarities to the observed control studies of the 1954 Field Trials except that approximately ten times as many school children had received at least one inoculation and prior arrangements for evaluation had not been made.

Many States rapidly developed plans for special studies in collaboration with CDC. Epidemic Intelligence Service Officers were assigned to participate in many areas. Funds that were being made available to the participating laboratories were directed to the support of these studies. The gathering together of data regarding effectiveness of the vaccine as used in 1955 became a major aspect of the Surveillance Program. Special studies of varying degree of detail are in progress in approximately 20 States. In some of these, the groups inoculated during the 1954 Field Trials remain under observation and are large enough to give promise of some evaluation of the duration of immunity and the effectiveness of booster inoculations. Preliminary reports have been received from 11 States and one city for inclusion in this paper.

The preliminary report from New York State, submitted by Dr. William G. Beadenkopf, illustrates the basically simple pattern of these special studies . . . Four distinct groups of immunized children, totalling almost 450,000, are under observation along with a group of 282,000 unvaccinated children. Attack rates for paralytic cases are 4.0 per 100,000 for the total inoculated group and 20.9 for the uninoculated children, making a ratio of greater than 5 to 1 in favor of the vaccine.

Attack rates for nonparalytic cases are 28.5 among vaccinated children and 39.4 among the unvaccinated, the ratio of these two rates being somewhat less than 3 to 2 in favor of the vaccine. Distinctions in attack rates for either paralytic or nonparalytic cases among the four separate groups of vaccinated children are not evident. The absence of paralytic cases from the small group of children inoculated in 1954 and boosted in 1955 is interesting but not statistically significant. When the final data are available giving more accurate classification of paralytic cases and laboratory confirmation or exclusion of the cases now classified as nonparalytic, considerable differences in the rates may be anticipated, although it seems doubtful that the 5 to 1 difference in incidence of paralytic cases among vaccinated children will be nullified.

Table 8 (omitted) presents a simple summary of preliminary reports of special studies that have been submitted from 11 States and New York City. The size of the study populations and the number of cases by paralytic status are shown for each state. These data were used to calculate attack rates as shown in Table 9. There is a marked difference between the attack rates for the vaccinated and unvaccinated groups. For paralytic cases, the rates are from two to more than five times greater in the unvaccinated than in the vaccinated groups. For the nonparalytic cases, no differences were observed in some States and rates up to two or more times greater in others.

In evaluating these preliminary reports many possible sources of error must be kept in mind such as the accuracy and completeness of the history of vaccination, the criteria for classification of paralytic status, and the accuracy of the population estimates. In some areas, outbreaks of diseases that clinically resemble nonparalytic polio have been prevalent. Another problem arises in classifying cases of polio developing shortly after inoculation and before immunity can be expected to have developed. These and other factors of bias must be considered. When final reports are available, many differences from these preliminary figures may be expected. At present, it is difficult to judge whether these factors of bias serve to exaggerate or minimize the effect of the vaccine.

Because of these unassessed factors of bias, a search was made for some independent confirmation of the results of these special studies. The Age Distribution Analysis Study was designed for this purpose. Since it was known that the age-specific attack rates for poliomyelitis followed a relatively continuous distribution curve and since use of poliomyelitis vaccine had been restricted almost solely to 1st and 2nd grade children representing mostly 7- and 8-year-olds, a discontinuity should appear in the age distribution this year if the vaccine were effective.

On collaboration with 33 States, data on age, onset and reported paralytic status of all cases of poliomyelitis are being submitted to the

Polio Surveillance Unit. As a control, similar tabulations for the year 1952 have been compiled from 21 of these 33 States . . . . .

The upper half of Figure 3 shows curves describing paralytic poliomyelitis for 1952 and 1955 . . . The absolute level of the rates for the 2 years differs because of the severity of the epidemic in 1952 compared to 1955, and because data for the full calendar year are included for 1952 and data only for the period July 3 through October 14 are included for 1955. The two curves have been superimposed by a simple arithmetic transposition. The two rate scales are clearly shown.

The two distribution curves for paralytic cases are similar with one major exception, namely, a relatively sharp lowering of the rates for ages 7 and 8 in 1955. This discontinuity in the age distribution curve is limited to the ages in which poliomyelitis vaccine was widely used this year. This discontinuity constitutes independent evidence of the effectiveness of the vaccine against paralytic polio.

In the lower half of Figure 3 are shown the age distribution curves for nonparalytic cases in 1952 and 1955. A different transposition factor has been used to superimpose the curves. No sharp discontinuity is discerned that can be clearly attributed to an effect of the vaccine.

Summary

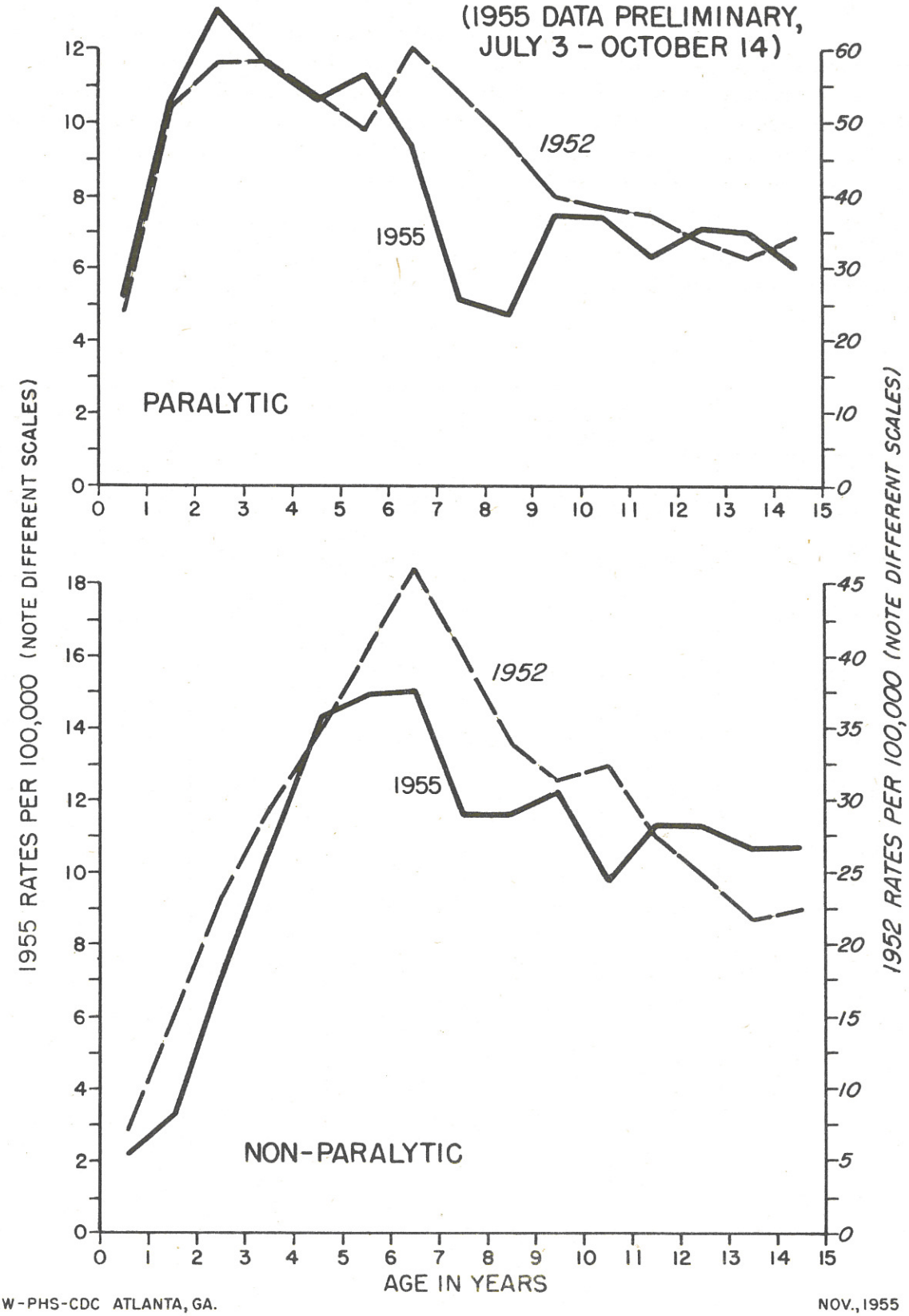
The National Poliomyelitis Surveillance Program was initiated in April 1955 to serve as a clearinghouse for the collection, consolidation, and dissemination of all pertinent epidemiologic information concerning the poliomyelitis problems facing the nation. Headquarters of the Program are located in the Communicable Disease Center in Atlanta, Ga. All States and Territories are collaborating in the Program. More than 40 laboratories are participating. Epidemic Intelligence Service Officers have served with first priority duty throughout the spring and summer and many are still working essentially full time on poliomyelitis.

The Surveillance Program has been concerned with two main problems, (1) the epidemiologic evaluation of the safety, and (2) the measurement of the effectiveness of the vaccine.

A total of 204 cases of poliomyelitis with 11 deaths are known to have occurred in association with vaccine manufactured by Cutter Laboratories. Of these, 79 were among vaccinated children, 105 among family contacts of vaccinated children and 20 among community contacts. The epidemiologic pattern of these cases including (1) their geographic distribution, (2) the association of cases with particular lots of vaccine, (3) the grouping of the onsets of most of the cases with appropriate incubation periods following inoculation, and (4) the correlation between the site of inoculation and the site of first paralysis in a majority of the vaccinated cases, supports

Figure 3

POLIOMYELITIS AGE-SPECIFIC ATTACK RATES IN 1955 (33 States) and 1952 (21 States)



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the conclusion that live virus in infective amounts was present in some distribution lots of Cutter vaccine.

A problem was also encountered in the epidemiologic evaluation of a few cases of poliomyelitis that occurred in association with one lot of vaccine manufactured by Wyeth Laboratories. Except for the difficulties with some lots of Cutter and one lot of Wyeth vaccine, however, no other situation involving the possibility of unsafe lots of vaccine was recognized

Table 9. Summary of special studies reported from eleven States and New York City: poliomyelitis attack rates by paralytic status among vaccinated and unvaccinated children (preliminary reports received through November 1, 1955)

	Paralytic Rate per 100,000		Nonparalytic Rate per 100,000		Total Rate per 100,000	
	Vaccinated	Unvaccinated	Vaccinated	Unvaccinated	Vaccinated	Unvaccinated
California	3.3	10.0	11.9	10.4	15.2	20.4
Connecticut	5.7	20.1	35.8	66.0	41.5	94.0
Florida	1.3	4.9	15.4	11.1	16.7	24.9
Georgia	3.4	7.6	3.4	7.2	6.9	14.9
Illinois	1.4	10.4	12.6	24.5	14.0	35.0
Maryland	3.6	17.1	--	--	--	--
Minnesota	2.7	30.1	18.7	36.1	21.4	66.1
New York City	5.4	21.8	7.8	36.8	13.3	58.6
New York State	4.0	20.9	28.5	39.4	34.1	63.1
No. Carolina	2.0	10.8	9.7	25.0	11.7	37.9
Oregon	2.1	15.2	4.2	8.7	6.3	23.8
Washington	5.8	21.0	1.4	10.5	7.2	31.5

in the more than four million inoculations that were given in April and early May.

Since the middle of May, when a complete revision of safety standards and clearance procedures was adopted, no epidemiologic evidence has come to light that tends to render suspect any lot of vaccine of any manufacturer.

Preliminary reports indicate encouraging results regarding the effectiveness of the vaccine. The restriction of inoculations to 1st and 2nd grade children during the spring and summer of 1955 provided a unique opportunity for special studies to evaluate effectiveness. Approximately 20 States are conducting such investigations. Tentative results, subject to modification and revision, reveal that the attack rates for paralytic polio are from two to more than five times greater in the unvaccinated than in the vaccinated children. Less marked but favorable differences are reported for nonparalytic cases.

Confirmation of these preliminary findings has been obtained from a study of the pattern of the age distribution of cases of poliomyelitis reported this year from 33 States. A sharp reduction in paralytic attack rates in 7- and 8-year-old children has been observed in comparison to the expected rates based on past experience. This finding constitutes an independent confirmation of the effectiveness of the vaccine as used this year.

* * * * * *

Local Cold Injury

(The following article is based upon Army TB Med 81 and is intended to provide Naval Medical officers witha brief account of the present status of local cold injury as a military medical problem in ground operations. Immersion foot and immersion hypothermia, which are primarily Naval medical problems, will be subjects of later reports.)

Local injury from cold can occur at ambient temperatures above freezing as well as below freezing. Nonfreezing injuries include chilblains, trenchfoot, and immersion foot. "Frostbite" is the name applied to a freezing injury.

The pathophysiology of cold injury, both freezing and nonfreezing, is still unsettled. In nonfreezing injuries, peripheral circulatory slowing resulting from venostasis in dependent extremities, tightly fitting clothing, reflex vasoconstriction, and increased blood viscosity leads to impaired oxygenation of the tissues, inadequate removal of metabolites, increased capillary permeability, and intravascular agglutination of red cells. In freezing injuries, ice crystal formation occurs in intercellular spaces,

extracting water from the cells and producing osmotic and possibly mechanical injury of tissue cells. There is lack of agreement as to whether blood vessels are the chief target of cold injury or whether tissue injury is primary with secondary changes in vascular permeability and circulation.

Nonfreezing injuries occur at ambient temperatures that are above freezing, but usually below 50° F. Exposure time varies, but is usually measured in many hours up to several days. The rapidity of onset and severity of injury depends on the degree of cold and duration of exposure. Environmental wetness is a contributing factor in nonfreezing injuries because it accelerates local heat loss and, thus, further reduces tissue temperature. Frostbite always occurs at ambient temperatures below freezing. Exposure times may be very brief as in case of altitude frostbite, but are usually measured in hours.

Cold injury may be superficial and be manifested after rewarming only as hyperemia and edema (1st degree), or may be more severe as indicated by vesicle formation (2nd degree), by necrosis of the skin and subcutaneous tissue (3rd degree), or by complete destruction of the tissue including bone (4th degree). The victim experiences tingling, aching, or cramping pain as the part which was without sensation begins to warm. Following the initial hyperemia, there is seen edema and discoloration of the affected part. Desquamation, eschar formation, ulceration, or gangrene is later observed depending on the degree of injury. Hyperhidrosis, cyanosis, paresthesias, and sensitivity to cold persist for weeks or months. Such sequelae together with muscle atrophy and signs of lasting nerve injury are more common in the nonfreezing cold injuries than in frostbite.

Treatment designed to maintain circulation following rewarming includes the use of peripheral vasodilatants, sympathetic nerve block, heparin, dicumarol, and rutin. Other therapeutic agents which have been tried include antihistaminics and cortisone. There is no clear indication that any of these agents exert a beneficial effect on the outcome of cold injury. The value of rapid rewarming, on the other hand, has been verified many times in experimental studies of frostbite in animals. Controlled studies of this treatment in humans, however, are still lacking. In most cases of frostbite occurring in the military field slow thawing has already occurred by the time the victim is seen by medical personnel. In the event thawing may not have occurred, immediate rewarming of the part by immersion in water at 95 - 105° F. is recommended. Placing the frozen hand under the armpit, or the frozen foot against the warm skin of a bunker-mate can be considered as an emergency application of the rapid rewarming principle. Other first aid measures include restoring general body temperature in the case of chilling, protection of the injured part from trauma, and prevention of infection through use of antibiotics and antitetanus toxoid.

Definitive treatment includes prolonged hospitalization at bed rest with exposure of the lesions to room air at 70 - 74° F., nutritious diet, interdiction of smoking, physiotherapy, debridement of vesicles and necrotic tissue, and continued antibiotic therapy.

Prevention remains the only satisfactory method of controlling local cold injury. The epidemiological approach to prevention of mass diseases recognizes multiple factors in causation relating to the agent, host, and environment. Factors relating to the agent, in this instance cold, include not only air temperature, but also wetness and wind both of which accelerate heat loss from the body and its extremities. Weather prediction from meteorological data, as a means of anticipating and preparing for cold hazards, was adopted by the Army in the second winter of the Korean War.

Environmental factors other than cold include the type of combat action to which combat personnel are exposed. Active defense and offense may lead to prolonged immobility and exposure with little opportunity to rewarm or change clothing.

Protective clothing should be available when it is needed and should be properly worn because it is essential for the maintenance of body heat. This is as important as proper hand, head, and foot gear in preventing cold injury. Avoidance of constriction, adequate ventilation, and cleanliness of clothing are important considerations in the use of cold-weather gear. The insulated rubber combat boot is supplied to personnel within the combat zone in cold weather. This has proved effective in preventing freezing injury of the feet, but its use demands special attention to foot hygiene with frequent drying of the feet and changing to clean dry socks to prevent maceration of the skin which can lead to trauma and infection. Daily inspection by an officer responsible for control of cold injury will help ensure good personal hygiene. The officer's other functions include checking frequently on the supply of clothing, socks, and boots, instructing new personnel in the proper use of clothing, and other preventive measures.

Among host factors deserving mention are the degree of discipline, morale, training, and indoctrination with which the individual is provided to enable him to cope with the cold hazard. The primary responsibility in this case lies with the line commander, but the staff medical officer and the cold injury control officer play important roles in the training and indoctrination of men in preventive methods and also serve the commanding officer importantly in an advisory and "alerting" capacity.

The Negro soldier and those coming from warm climates are especially prone to cold injury. A history of either trench foot, immersion foot, or frostbite, or a history of peripheral vascular disease increases the individuals risk of cold injury. Psychiatric studies of cold casualties indicate that personality traits characterized as "immature," "negativistic," or

"schizoid," are fairly typical. Mental and physical fatigue, unless controlled by a well-planned system of rotation of frontline personnel, are factors causally associated with outbreaks of cold injury even in emotionally stable individuals.

Susceptible individuals or groups within a military population will require special protection and supervision to prevent their becoming casualties of cold injury. (David Minard, CDR MC USN, PrevMedDiv, BuMed)

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Course in Photofluorographic Interpretation

A 3 months course in photofluorographic interpretation given at the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Md., is available to medical officers of the regular Navy and the Naval Reserve. This course serves as a background for further training in internal medicine, diseases of the chest, and radiology.

Interested medical officers should submit an official request to the Bureau of Medicine and Surgery, Attention Code 7212, for consideration. No service agreement is required. Reserve medical officers are eligible for this training providing they will have at least one year of obligated service remaining upon completion of their instruction.

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